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IRRIGATION BY PUMPING

IN

WESTERN KANSAS.

BY
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Irrigation by Pumping in Western Kansas.

By F. D. COBURN.

There is scarcely an agricultural region anywhere that would not at some period in almost any season consider itself fortunate if water could be had for its crops when timely rains are not forthcoming. Even in New Jersey, New York and other eastern states, irrigation plants are installed to supplement the rains and as insurance against their failure.

Every region is subject to vagaries of the weather. In some years there is sufficient seasonable rainfall for the growth of excellent crops; in others yields are materially reduced or made impossible by lack of it, and this applies almost universally. Western Kansas has one advantage over the humid countries, however, in that it seldom suffers from too much water. With water at just the right time, the rich soils of the prairies produce prodigiously, and wherever there are irrigation waters available they should be utilized. Irrigation farming has often been referred to as the ideal agriculture. Intelligently followed on the plains, there is small question as to yields, and surroundings there are most favorable for harvesting and curing crops in the best possible condition.

For years the feasibility of utilizing the underground waters of western Kansas for irrigation has been discussed at the annual meetings of the State Board of Agriculture, and learned scientists have contributed much on the subject that was pertinent and of interest. While it was agreed that the west third or half of the state possessed a so-called inexhaustible underground water supply, it seemed the consensus of opinion that it could not be profitably made use of for the irrigation of any considerable areas on the high lands, because of the lift being too great. Irrigation of the valleys, where water is near the surface, by pumping, long since passed the experimental stage, but its possibilities are not yet fully realized, as each season sees some new development. While this is important to the valleys, the great significance of the later investigations is the demonstrating here and there that the uplands can be profit-



Pumping water on upland at the rate of 1600 gallons per minute from the Lough well, in western Kansas.

ably irrigated by pumping from deep bored wells, as these lands comprise by far the greatest acreage. Their soils are rich and of such texture that experts declare they will need less (some say only about one-half as much) water to produce crops as the sandier lands of the valleys. Again, there will be seasons when the rainfall will be such as to require only partial, if any, use of the pumping plant, and it begins to look as if many thousands of acres of western Kansas may be made reliably productive through artificial watering. In the Arkansas river valley from Garden City to Syracuse many pumping plants are already operating or being installed.

There are a number of wells being bored and put into use on the higher lands at the present time, here and there, from Meade county, in the southwest, north and west to Sherman county. At Fowler, in Meade county, the Walker well is finished and equipped ready for use. In Sherman county two big wells have been bored into the gravel that carries apparently unlimited water, and pumps are now being installed. This suggests in a very general way something of the territory where a water supply may be profitably available for irrigation by pumping. Only one of these big upland wells was in commission during the crop season of 1911. This was the J. W. Lough well, about twelve miles southwest of Scott, in Scott county. From it were irrigated 180 acres, all that could be made ready in time for planting, but the owner estimates that the well will take care of 320 acres. On the 180 acres were raised potatoes, beans, cucumbers, watermelons, turnips and other vegetables in profusion. The yield of milo was estimated as high as seventy bushels per acre, and oats and barley at fifty to sixty bushels. Sorghum grew to a height of ten feet. This was planted the first of June, irrigated three times, and cultivated. Another field was broadcasted to sorghum the first of August, irrigated twice, and attained a growth of about six feet, making the finest quality of fodder. From a 31-acre field of alfalfa, sown in 1910, four cuttings were secured the next season, averaging about a ton to the acre for each cutting. This is notable not alone because there was no considerable rainfall there in 1911, but because the summer was unusually hot, one of the most trying and unfavorable in years. The weather itself subjected the demonstration to the severest test, and the results, in spite of the inhospitable conditions, were

most gratifying. This experiment suggests in a striking way what water applied at the right time makes possible on those rich soils.

This well is 130 feet deep, with 24-inch casing. The total cost, including pumping equipment, was not far from \$3500. As Mr. Lough was a pioneer in this, adjustments and changes after installation added quite a bit to the cost. The Niquette well, of practically the same depth and equipment, at McCue, the first station south of Scott, cost \$3200, complete. Each of these wells, it is estimated, will irrigate a half section. If this proves correct it means an outlay of but \$10 per acre for a permanent water right, owned and controlled by the individual.

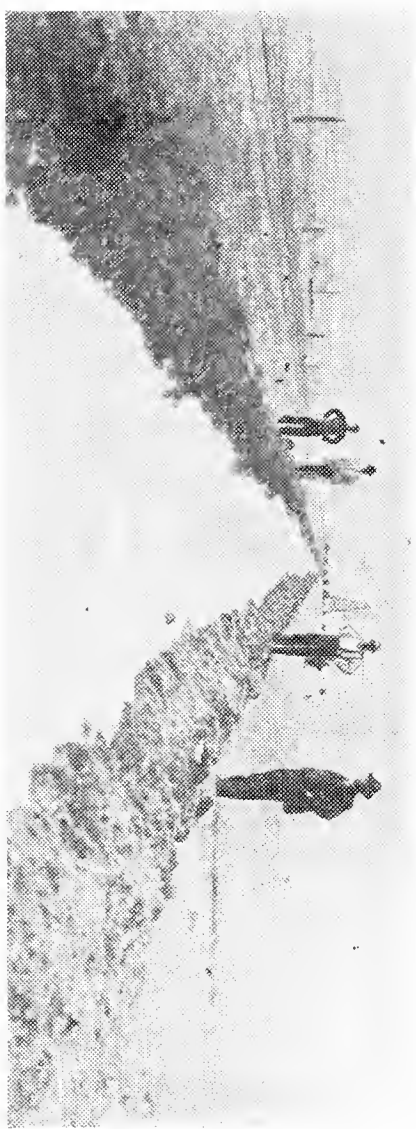
The Lough well extends through 70 feet of the water-bearing gravel, without a layer of any other material. This makes it 60 feet to water. The water stands higher in the well, of course, when the pump is not working, and when the engine is started the water is gradually lowered to about 75 feet from the discharge, which is the extreme distance the water is lifted. Thus far no amount of pumping lowers the water head beyond that point. The equipment is a centrifugal pump and a 60-horsepower fuel-oil engine, and water is steadily lifted, according to Mr. Lough's report, at the rate of 1600 gallons a minute. This is carried in ditches by gravity direct from the well to the land watered, some of it two miles from the pump, and no reservoir is used or regarded as necessary. This year's experience indicates that the cost of putting the water on the land is about 50 cents per acre at each irrigation. The engine burns about 100 gallons of oil every 15 hours, costing $2\frac{1}{2}$ cents per gallon laid down in Scott. The well is located on one of the highest points in the township, and the water is drawn through a $9\frac{1}{4}$ -inch pipe.

From this it seems that these large wells, with centrifugal pumps and powerful cheap-fuel engines are helping to solve the problem of utilizing the underground waters to irrigate the uplands. To what extent this may be carried no one can at this time tell, but that it should be developed to its fullest capacity is patent.

One of the most striking examples of the transformation possible by irrigation in western Kansas is afforded by the experience of P. Finello, on two acres in the outskirts of



Alfalfa, fourteen months from sowing, on the Lough ranch, in Scott county. Sowed in the summer of 1910, yielding in the following year four cuttings, averaging a ton per acre each, under irrigation, in the dry season of 1911.

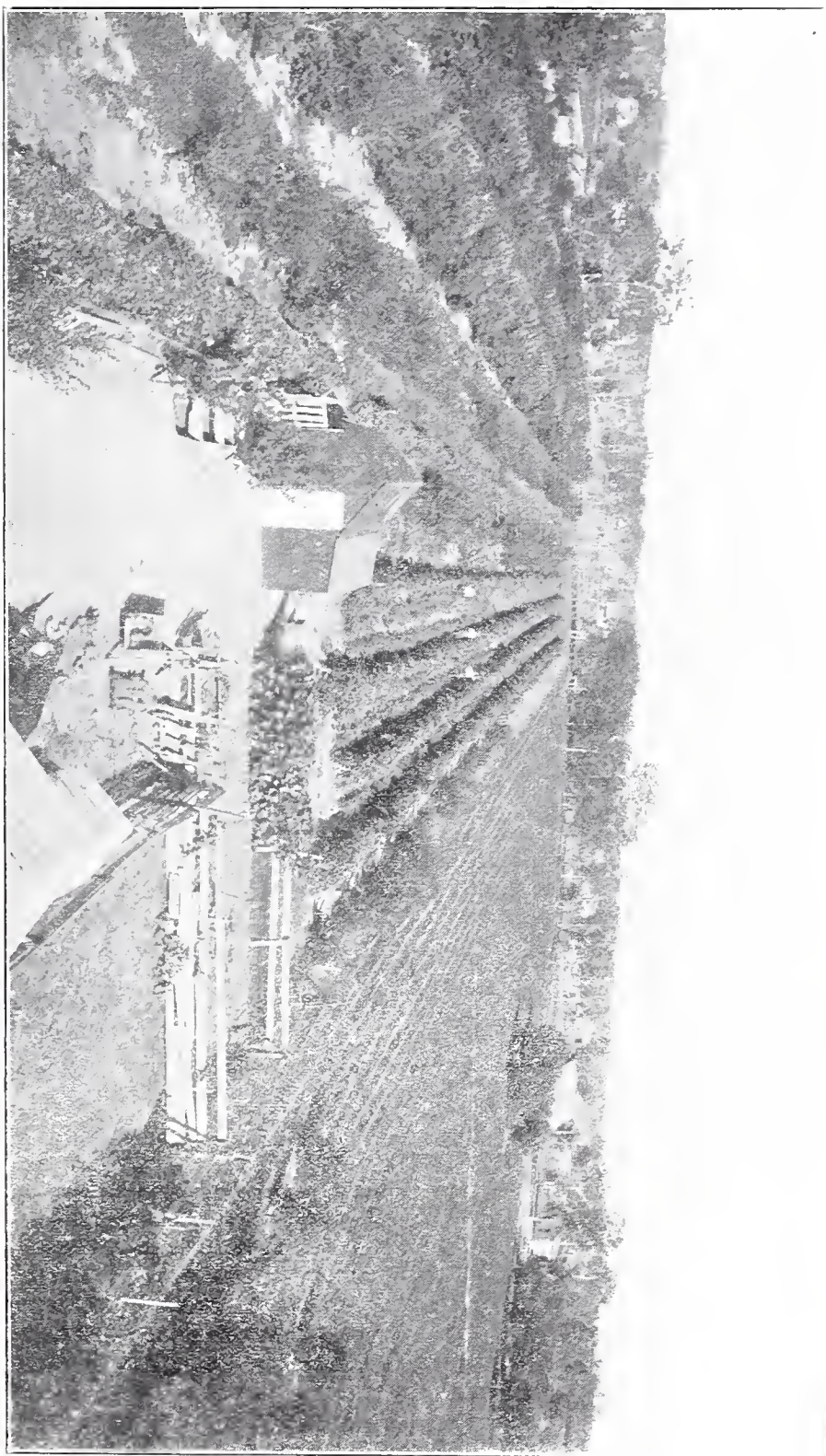


The main ditch conducting water from the Lough well. This well is estimated by its owner to supply water for 320 acres.

Garden City. This, of course, is in the Arkansas river valley, where the distance to water is only about nine feet. When he moved on the land it was devoid of trees or vegetation, and now it is a wonderful garden. In the spring of 1908 he installed a pumping plant consisting of a seven-horsepower gasoline engine, and one centrifugal pump, with accessories, at a cost of \$293. His well is 46 feet deep, and 16 inches in diameter. The pump draws 265 gallons per minute, with no perceptible decrease in the water supply, at a cost of about seven cents per hour, and in six hours the entire tract can be thoroughly watered. Mr. Finello's actual work with trees on this tract began in 1908, and he has on the place about 80 each of cherry, peach and plum, and 1500 grape vines, all now coming into bearing. Between the trees he raises vegetables in profusion, such as tomatoes, beans, peppers, cantaloupes, and watermelons. It is a most impressive demonstration of what a combination of soil, sunshine, intelligence and water will do in that region, and is suggestive of future developments.

Much interest has been manifested lately, too, in the development of artesian water, the firm of Wilson & Dean at Richfield, in Morton county, having brought in the best well of this character in Kansas, having a natural flow of 600 gallons per minute. While only a limited area could be made ready for crops in 1911, it was sufficient to show strikingly the wonders that water will bring about. Alfalfa sowed on sod June 20, 1911, yielded one and one-half tons per acre for the season and is a perfect stand. Trees in a park that has been laid out made an excellent growth, and a great variety of garden truck returned good yields. This same firm has obtained artesian flow in a second well, and an outfit is now drilling for artesian water at Hugoton, in Stevens, adjoining Morton county on the east. Also Meade, the third county east from Morton, has numerous artesian wells, used, however, only in a very limited way for irrigation.

Often the distribution of rainfall in the western end of the state is adequate for various crops, but wherever the underground waters are found in sufficient quantities it is undoubtedly good business to use them as supplemental to rains that may be tardy in their coming. Under irrigation the farming will be more intensive and develop along lines quite different from those followed at first, supporting a greatly increased



The P. Finchio fruit and truck farm, in the suburbs of Garden City, upper Arkansas valley. Transformed from a bare spot by water from a well costing, with complete pumping equipment installed, \$293.

population. Wherever irrigation by pumping may be done it will bring about wonderful changes, and where, for any reason, large wells are not practicable or possible, garden patches can and should be watered from those of less capacity. As this article is being prepared a letter has arrived telling of a Gove county man's experience in 1911 in irrigating a half-acre garden from a small stock well, the water being lifted by wind-mill. The value of the produce from the half acre is reported as follows:

Vegetables sold	\$20 00
Cucumber pickles in brine	12 00
Onions	4 00
Potatoes	45 00
Pumpkins	4 00
Sweet potatoes	2 00
Total	<u>\$87 00</u>

In addition to this there was "an almost endless amount of truck, such as green onions, radishes, tomatoes, cabbage, peas, beans, muskmelons, watermelons that we used ourselves," to quote the words of the farmer himself.

Since the foregoing was written the following letter has been received from Mr. J. W. Lough, whose pumping plant it refers to, in Scott county, Kansas, giving more specific information as to his operations in pumping and irrigating from deep wells on upland:

Mr. F. D. Coburn, Secretary: SCOTT CITY, KAN., February 1, 1912.

DEAR SIR—Since your investigation of irrigation by pumping in Scott county, Kansas, in which I am much interested, and since your report of the same, I have been besieged by requests for further information. In order to give the inquirers and general public information as to details, and in accordance with your suggestions, I have prepared the following; but not for the purpose of selling land, as I have none to sell. I have quite a large tract that I am beginning to develop, and I am still buying more:

Scott City is in the exact center of the western third of Kansas. We now have two wells equipped with pumps and engines, one being on the section one mile east of Scott City, the other about twelve miles southwest. Both were thoroughly tested during the hot, dry months of July and August, 1911, by pumping both day and night several days in succession, without lowering the water in the wells more than 12 or 14 feet. The well east of Scott is 36 feet to the water and 110 to its bottom; the other is 63 feet to the water and 130 feet to bottom.

The source of the water supply is undoubtedly in the Rocky Mountains

of Colorado, as it has been tested in different ways, showing that it constantly flows eastward. To my certain knowledge there is no difference in this underflow, whether the rainfall be either scant or heavy.

The water is always clear, cold, soft and pure, and healthful for the growing of plants. This is found in coarse sand and gravel, and at different depths, say from 15 to 75 feet from the surface, and in some cases more. The water-bearing sand and gravel varies considerably in thickness, from a thin stratum up to 60 or 70 feet. The big wells are governed by the thickness of the sand and gravel, as the big underflow does not extend all over the county. But in cases of less extensive strata of sand and gravel not sufficient to supply a big pump, a smaller and cheaper equipment can be used with considerably less expense.

Our wells are 24 inches in diameter, cased with No. 8 iron or steel, and cost \$3 per foot down to the water, and from there to the bottom of the wells I use a screen of the same size, perforated to let the water in and hold the sand back, which cost \$8 per foot. Our pump is a Layne & Bowler, made in Texas, and the engine for power is a Charter gas engine with Solar oil attachments, made in Illinois. Both have proven successful in actual use. There are also various other pumps and engines being offered for the same work.

We can pump 1500 gallons per minute, and water or flood one acre per hour. The fuel and lubricating oils will cost about 40 cents per hour for a 60-horsepower oil engine. Cost of a plant will depend on the depth of the well, as the deeper and greater the lift of water the larger the engine must be; in other words, it takes more horsepower, and this costs about \$30 per horse; also, the labor for making the well will cost \$3 per foot, the casing \$3 per foot, and the material in the pump figures the same way per foot. The deeper the well the more it costs. The average pump will cost about \$550. This is a centrifugal, and will draw water 100 feet or more; it is altogether different from a plunger suction pump, as it does not require leather valves at all, but just a rotary motion, with paddles or fans, and at a high speed this forces the water up. The pump troubles are very small.

The difference between dry farming and irrigation is wide. With water, four good crops of alfalfa can be raised on the high upland, even though it is 100 feet to the water; without the water we can not raise much alfalfa on such land from the natural rainfall. After alfalfa is once started it does n't require any more seed, plowing or cultivation; it becomes better right along and improves the soil. Other crops are made certain by irrigation.

One can buy land here from \$15 to \$25 per acre and up, owing to location, improvements and prospects of a water supply. From one well and pump I irrigated 180 acres in 1911, and raised good crops. Alfalfa sown July 10, 1910, made four good cuttings in the summer of 1911, and the four cuttings meant at least a ten-foot growth. Sorghum planted in June reached ten feet in height, and that drilled August 1 grew six feet high and made fine feed. I had oats, barley, milo maize and kaffir corn that men from grain countries say will go from forty to sixty bushels per acre, but these are not yet thrashed. I would advise if you

care to know what my irrigated crops look like to send here to M. R. Potter, photographer, and secure picture cards showing crops in the fields and the alfalfa stacks, which will explain more than my words can express. The cards cost five cents each.

Any further information desired I will cheerfully give as correctly as possible. If desired I will have officials of both banks in Scott City certify to its correctness.

(Signed) J. W. LOUGH.